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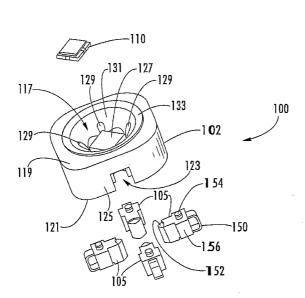
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[Continued on next page]

(54) Title: SEMICONDUCTOR LIGHT EMITTING DEVICE MOUNTING SUBSTRATES INCLUDING A CONDUCTIVE LEAD EXTENDING THEREIN AND METHODS OF PACKAGING SAME





(57) Abstract: A mounting substrate for a semiconductor light emitting device includes a thermally conductive mounting block. The mounting block has, in a first face thereof, a cavity that is configured to mount a semiconductor light emitting device therein and to reflect light that is emitted by the semiconductor light emitting device that is mounted therein away from the cavity. A conductive lead inserted into the mounting block extends into the cavity. The conductive lead is electrically isolated from the mounting block and has an exposed contact portion in the cavity. The conductive lead may be a plurality of conductive leads each having an exposed contact portion at different locations in the cavity. Related packaging methods also may be provided.



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Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

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Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Х	US 2004/079957 A1 (ANDREWS PETER SCOTT ET AL) 29 April 2004 (2004-04-29) page 2, paragraph 39 - page 4, paragraph 57; figures 1a,1b,3,5	1-61
Х	US 2002/158320 A1 (TAKEKUMA AKIRA) 31 October 2002 (2002-10-31)	1-56
Α	page 3, paragraph 43 – page 4, paragraph 54; figures 3a-3c,5a-6b	57–61
Χ	EP 1 385 217 A (MATSUSHITA ELECTRIC WORKS, LTD) 28 January 2004 (2004-01-28)	1-56
Α .	page 7, paragraph 44 - page 9, paragraph 57; figures 1-6,9b	57-61
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A	DE 101 22 002 A1 (OSRAM OPTO SEMICONDUCTORS GMBH & CO. OHG) 21 November 2002 (2002-11-21) column 4, paragraph 35 - column 5, paragraph 46; figures 2,3	1-61	

#### INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/US2006/000335

Patent document cited in search report		Publication date		Patent family member(s)	Publication date
US 2004079957	A1	29-04-2004	AU CA CN EP JP WO US	2003276860 A1 2496937 A1 1679168 A 1537603 A2 2005538550 T 2004023522 A2 2004041222 A1	29-03-2004 18-03-2004 05-10-2005 08-06-2005 15-12-2005 18-03-2004 04-03-2004
US 2002158320	A1	31-10-2002	DE JP	10205698 A1 2002246650 A	31-10-2002 30-08-2002
EP 1385217	Α	28-01-2004	CN	1471178 A	28-01-2004
DE 10122002	A1	21-11-2002	WO	02091478 A2	14-11-2002